A NEW SPECIES OF MICROHYLID FROG OF THE GENUS *SPHENOPHRYNE* FROM MILNE BAY, PAPUA

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Summary

A new species of terrestrial, forest-dwelling, microhylid frog, *Sphenophryne dentata* is described. It is unique amongst Papuan members of this family in having well developed maxillary and premaxillary teeth, and numerous, prominent folds on the skin of the dorsum. The mating call is analysed and described, and is noteworthy in lasting for nearly ninety seconds. Ecological differences between this species and twelve other species found in the same forest are briefly discussed.

Introduction

Nineteen species of microhylid frogs have been found at the south-eastern extremity of Papua and from islands adjacent to this portion of the mainland. Parker (1934) reported seven species, Zweifel (1956) a further ten, and Zweifel (1963) two more. Of the total, eight species are currently known solely from this area. Milne Bay is located at the extreme eastern end of Papua. Collections made there by one of us (J.I.M.) in 1969 and 1970 included twenty-two specimens of an undescribed species of the microhylid genus *Sphenophryne*.

In our description of this species we have followed very closely the methods, descriptive format, and terminology adopted by Zweifel (1967). The abbreviations used in the text are as follows: S-V = length from snout to vent; TL = tibia length; HW = head width; E = eye diameter; IN = internarial span; E-N = eye to naris distance; SN = snout length; T = tympanum diameter.

Mating calls were recorded in the field on an E.M.I. type L.4 tape recorder, and analysed on a Kay Electric Company Sonagraph.

For the terms used in describing the sonagrams see Irby-Davis (1964).

The type series has been deposited in the collections of the Department of Biology, University of Papua and New Guinea (abbreviated in the text to U.P.N.G.) and the South Australian Museum (S.A.M.).

Sphenophryne dentata new species

Holotype: S.A.M. No. R.12063 collected near Alotau, Milne Bay, Territory of Papua on 11 November 1970, by J. I. Menzies.

Paratypes: U.P.N.G. No. 1727, S.A.M. No. R.11828, collected at the type locality on 8 October 1969; U.P.N.G. Nos. 2625-2629, 2640-2646, S.A.M. Nos. R.11819-11827, collected at the type locality during the period 6-12 November 1970.

Diagnosis: This is a terrestrial species, and the combination of characters that is unique to it is as follows: body size: moderate (snout to vent length up to 37.2 mm); maxillae and premaxillae dentigerous, fingers and toes with small discs, skin of dorsal surface of body bearing numerous prominent tubercles and raised folds.

Description of Holotype (fig. 1): The holotype is a gravid, adult female with the following measurements: S-V, 37.2 mm; TL, 18.4 mm; HW, 16.6 mm; E, 4.8 mm; E-N, 3.7 mm; IN, 4.0 mm; SN, 6.2 mm; T, 2.9 mm; disc of third finger, 0.9 mm; penultimate phalanx of third finger, 0.7 mm; disc of fourth toe, 1.4 mm; penultimate phalanx of fourth toe, 0.7 mm. The maxillary bones are eleutherognathine and bear, as do the premaxillaries, small teeth. The post-choanal portion of the vomer bears a transverse ridge on which there are numerous, minute odontoids. There are two transverse pre-pharyngeal ridges: a diffuse glandular one, preceding a more highly developed posterior ridge terminating in triangular serrations. The tongue is extremely broad, approximately one-half free and has two posterior flaps.

The pectoral girdle is similar to that of *S. cornuta* described and illustrated by Parker (1934).

The snout is blunt and very slightly rounded when viewed from above and in profile. The

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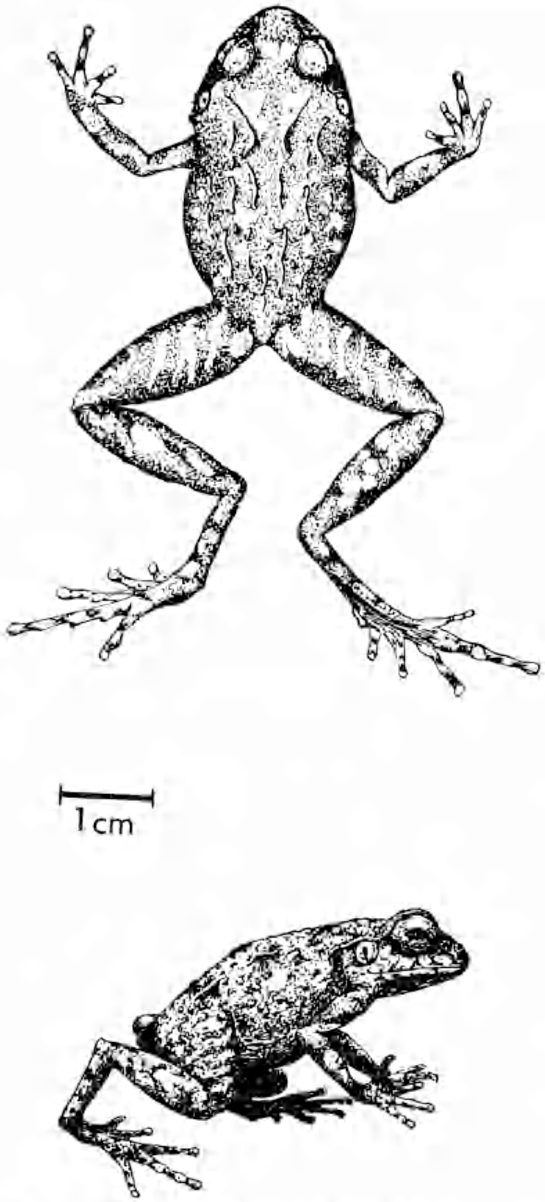

Fig. 1. *Sphenophryne dentata* new species.

head is as broad as the body, and its width is slightly less than one-half of the snout to vent length (HW/S-V = 0.45).

The eyes are large and prominent with a horizontal pupil and the interorbital distance is only slightly greater than the width of an upper eyelid. The snout is approximately one and one-third times the length of the eye (SN/E = 1.29). The loreal region is sloping and slightly concave, and the canthus rostralis slightly rounded but not prominent. The nostrils are directed laterally, and the distance from eye to naris is slightly less than the internarial span (E-N/IN = 0.92). The tympanum is distinct.

The fingers and toes bear small terminal discs on which there are marginal grooves. The discs of the toes are much larger than those of the fingers; the ratio of the width of the disc of the third finger to that of the fourth toe is 0.64. The relative difference in development of finger and toe discs is reflected by the ratios of disc width to the width of the penultimate phalanx. Those of the above digits are 1.29 and 2.0 respectively. Fingers and toes in decreasing orders of length 3>4>2>1 and 4>3>5>2>1 respectively. Subarticular tubercles are poorly developed beneath the fingers but well developed beneath the toes. There is an elongate and prominent inner metatarsal tubercle and a circular and poorly developed outer metatarsal tubercle.

The skin of the dorsal surface of the head and body is extremely irregular, bearing numerous prominent tubercles and sharply defined skin folds. The skin folds follow the longitudinal axis of the body except for those immediately behind the head which form the letter **W**. There is a prominent supratympanic fold. The ventral surfaces are smooth and the flanks slightly tubercular.

In preservative the ground colouration of the dorsal surface of the body and limbs is dark brown. Upon the dorsum there are a few, irregularly shaped, small patches now fading from orange to grey. A pair of these patches are located within the **W** mark on the back, and others on each side of the coccyx and on other portions of the back and flanks. The posterior surfaces of the femora bear pale, narrow transverse bands. The mandibular border is brown and the remainder of the ventral surface of the body lacks pigment.

Variation: The twenty-one paratypes include adults and juveniles. Several of the adult females are gravid, the smallest having a snout to vent length of 34.7 mm and the largest 37 mm. The means and ranges of the characters recorded are as follows: TL/S-V = 0.50 (0.47-0.54); HW/S-V = 0.43 (0.41-0.45); SN/E = 1.20 (1.07-1.29); E-N/IN = 0.91 (0.80-1.00).

All paratypes share with the holotype a dark brown dorsal ground colouration. The lighter markings described above vary in their distribution and are absent in several specimens.

In life the colouration of the dorsal surface varies from sandy brown to reddish

brown, stippled or mottled with darker and lighter brown, and with occasional orange patches of an irregular distribution. The scapular W-mark is occasionally reddish. The backs of the thighs are usually grey, and finely stippled with white, but sometimes pinkish. The ventral surface is white, with sparse grey mottling on the sides of the throat. The groins and lower sides of the hind limbs are reddish, sometimes bright red. There is a light diagonal stripe through the tympanic membrane and the iris is a greenish gold.

Comparison with Other Species

Sphenophryne dentata differs from all Papuan microhylids in possessing well developed teeth, and bears a striking resemblance to members of the ranid genus *Platymantis*. This is, however, only a superficial resemblance because the pectoral girdle is typically that of *Sphenophryne* and further lacks the bony omosternal elements that characterise Papuan ranids. Similarly the Musculus cutaneous pectoris which is present in all Papuan ranid genera is lacking in this species, as in all other microhylids examined (Tyler 1971a, 1971b). Additional features supporting the familial disposition of the species are the procoelous condition of the vertebrae, dilation of the sacral diapophyses and the presence of prepharyngeal, palatal folds.

The presence of teeth and of numerous skin folds are unique to this species and render it one of the most distinctive members of the genus. Of the fourteen species currently recognised, three Australian species (*S. fryi*, *S. pluvialis*, and *S. robusta*) and five Papuan species (*S. brevicrus*, *S. brevipes*, *S. crassa*, *S. mehelyi* and *S. polysticta*) are small robust animals not exceeding 30 mm in length.

Some of the salient distinguishing characters of the remaining species are as follows: *S. palmipes*, sympatric with *S. dentata*, is mainly aquatic and is readily distinguished by the presence of extensive webbing between the toes (absent in *S. dentata*). *Sphenophryne cornuta* possesses vestigeal teeth but exhibits a large conical tubercle on each upper eyelid, and in life may be bright red on the ventral surface; *S. hooglandi* has a prominent snout, smooth skin and a different colouration. *Sphenophryne macrorhyncha*, also mainly an aquatic species, has slight webbing between the toes, and the nostrils are equidistant between the eye and tip of the snout; *S. rhodadactyla* has a dark ventral surface with lighter markings, the finger discs are larger than the toe discs, and the maximum recorded snout to vent length is 60 mm. *Sphenophryne schlaginhaufeni* possesses skin folds on the scapular region but lacks the other folds and rugosities of *S. dentata*. It is readily distinguished from *S. dentata* by the shape of the snout (angular and strongly projecting in profile, with a very sharp canthus rostralis) and by its possession of a black loreal mask.

Ecological Note

All the specimens were collected on the forest floor of hillsides above the town of Alotau, Milne Bay District of Papua. These hillsides are steep and are dissected into numerous ridges and gullies by small streams running down to Milne Bay. The forest is well developed and remains largely untouched other than in the immediate vicinity of the town. The rainfall of the region is high (annual mean approximately 3,000 mm; 120 inches) but a season in which there is slightly less rainfall than in the remainder of the year usually commences in November and lasts until March or April.

In October 1969 few males were heard calling and only two were collected. However, in November 1970 large numbers were heard and found all over the forest floor. Because many of the adult females collected on the latter occasion were gravid, it appears that the breeding season corresponds to the 'dry' season at Milne Bay.

All the specimens in the type series were collected at altitudes between 60 and 150 metres (200-500 ft) above sea level. The maximum altitude at which the species occurs there is unknown, but the mountains in the region do not extend much above 1000 metres (approximately 3000 ft). The species occurs at slightly higher elevations on Mt Dayman, approximately 100 Km north-east of the type locality. A specimen taken at 1550 metres (American Museum of Natural History No. 56734) and tentatively referred to *S. schlaginhaufeni* by Zweifel (1956) has been examined by one of us (J.I.M.), and is considered to be a juvenile *S. dentata*.

Twelve other species of frogs, including nine microhylids were collected in the same forest as *S. dentata*, but ecological differences appear to separate most of them. *Sphenophryne palmipes* is aquatic; *Litoria genimaculata* (formerly *Hyla genimaculata*) and *Oreophryne biroi* are arboreal; a species of *Rana* is only found at the streamsides; *Cophixalus verrucosus*, *C. ateles*, and an *Oreophryne*

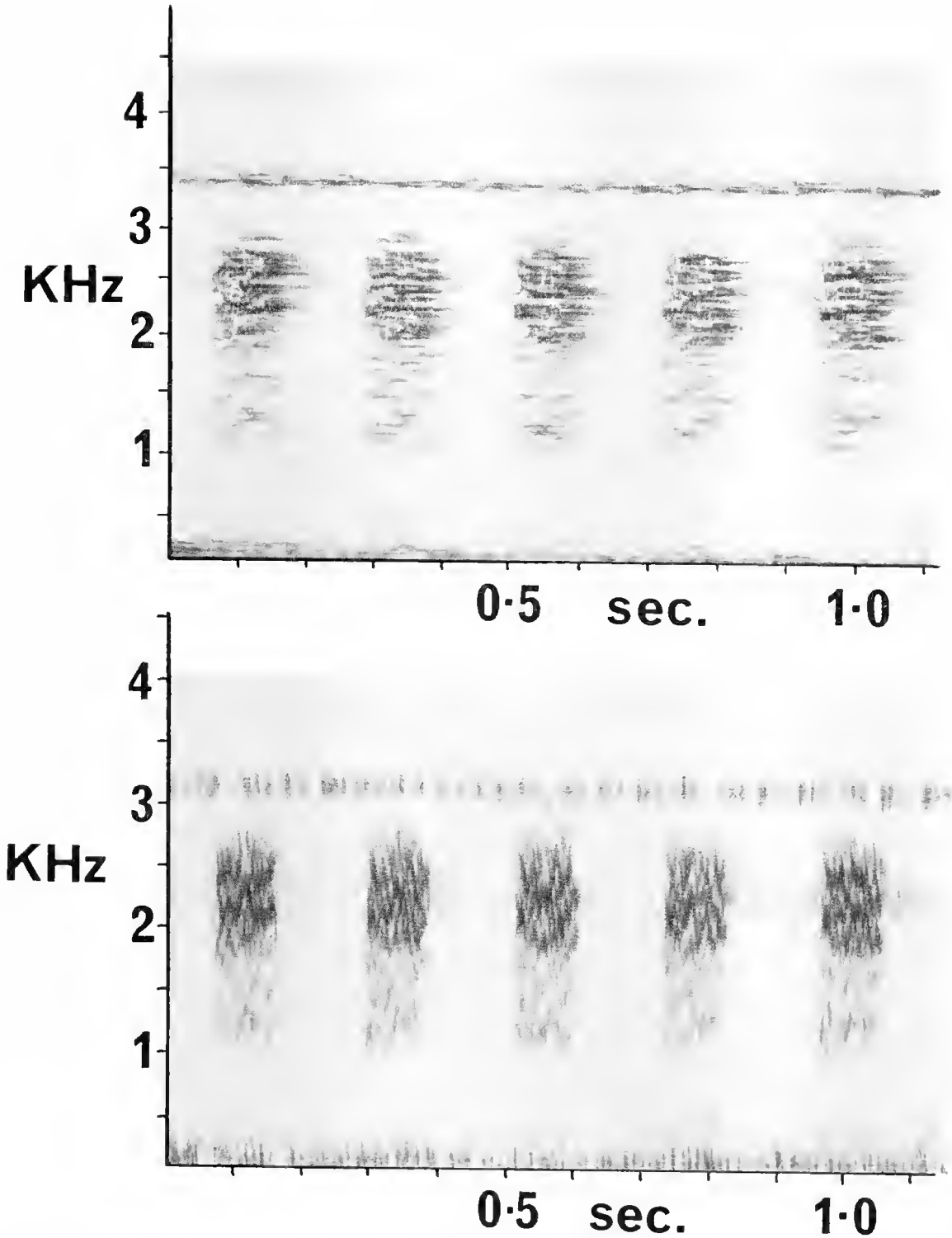

Fig. 2. *Sphenophryne dentata*. Sonagrams made from the middle of the call. (a) narrow filter. (b) wide filter. The continuous trace above 3 KHz is insect noise.

species hide in leaf litter on the forest floor during the day, but ascend low vegetation at night. *Asterophrys doriae* has been collected in subterranean burrows; *Platymantis papuensis* favours the forest floor but at this locality is usually found lower down the hillsides. *Metopostira ocellata*, *Cophixalus oxyrhinus* and *Asterophrys rufescens* are the only species which appear to occupy exactly the same habitat as *S. dentata*.

Voice

The call of the male consists of a very long succession of identical components, at first in acceleration then at a steady rate, finally in deceleration. It lasts for nearly ninety seconds and includes approximately 300 motifs, each of 0.1 second duration and including twelve figures. There is no clearly defined frequency intensity maximum: several bands between 2 and 3 KHz appear of equal importance. Sonograms of a small portion of the middle of the call are shown in Figure 2.

The acoustic impression is rather like the rapid bark of a dog and the call can be heard at a distance of several hundred metres.

Acknowledgements

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